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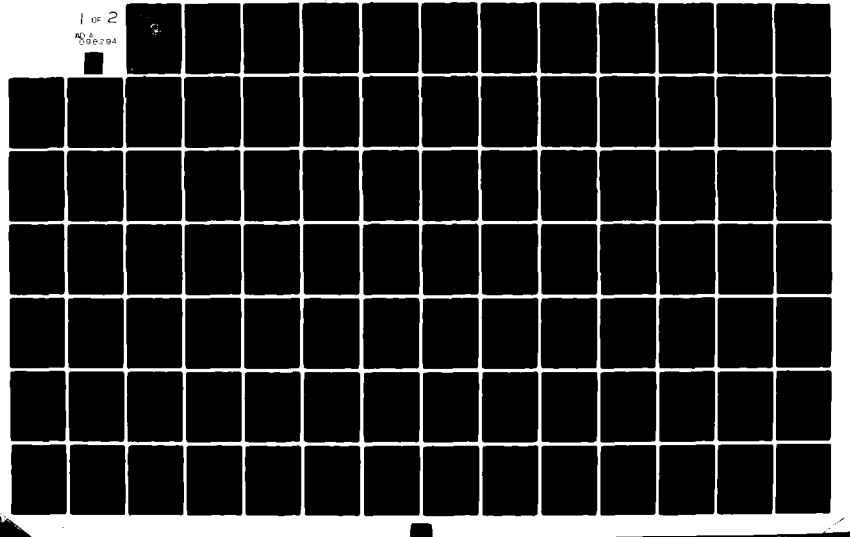

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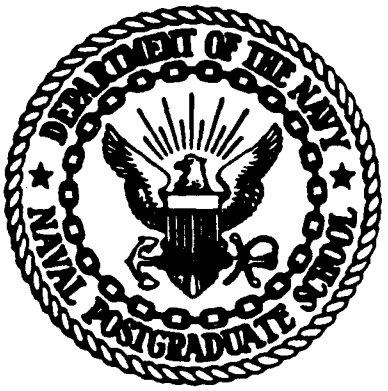

THESIS

(6) THE RELATIONSHIP OF INITIAL ASSIGNMENT AND PERSONAL BACKGROUND VARIABLES TO FIRST TERM ENLISTED ATTRITION FROM THE NAVY

by

(10) Daniel E. Gardner

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Thesis Advisor: R. S. Elster

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This thesis was conducted to compare the characteristics and attrition rates of first term enlisted personnel initially assigned to ships with those assigned to non-ship duty stations. Identification of traditional and non-traditional variables with emphasis on ship characteristics were evaluated as predictors of first term attrition rates.

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Ship Engineering Plant; Ship Homeport Location; Unit Identification Code (UIC); Ship Size (Personnel); Ship Age (Commissioning)

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their first 33 to 36 months in the Navy. The attrition rates for ship and non-ship duty personnel were compared using regression analysis techniques. Overall, the cohort initially assigned to ships had significantly lower attrition rates than those assigned to non-ship duty. Submarines experienced an attrition rate approximately one-half that of other ship types. The relatively low attrition rates from submarines may be due to high screening criteria and to the fact that sailors found to be inadequate performers are often transferred to the surface fleet. Observation of the mental group mix assigned to ships was not representative of the mental group mix of the entering cohort. The data showed underrepresentation of upper mental group and A-school trained personnel assigned to ship duty. This finding warrants further investigation.

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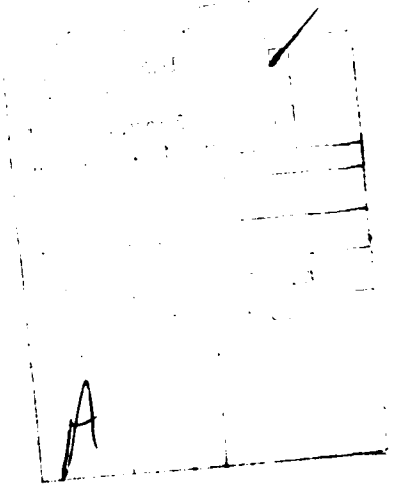

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The Relationship of Initial Assignment and Personal Background Variables to First Term Enlisted Attrition from the Navy

by

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ABSTRACT

This thesis was conducted to compare the characteristics and attrition rates of first term enlisted personnel initially assigned to ships with those assigned to non-ship duty stations. Identification of traditional and non-traditional variables with emphasis on ship characteristics were evaluated as predictors of first term attrition rates.

A cohort of non-prior service male recruits was tracked over their first 33 to 36 months in the Navy. The attrition rates for ship and non-ship duty personnel were compared using regression analysis techniques. Overall, the cohort initially assigned to ships had significantly lower attrition rates than those assigned to non-ship duty. Submarines experienced an attrition rate approximately one-half that of other ship types. The relatively low attrition rates from submarines may be due to high screening criteria and to the fact that sailors found to be inadequate performers are often transferred to the surface fleet. Observation of the mental group mix assigned to ships was not representative of the mental group mix of the entering cohort. The data showed underrepresentation of upper mental group and A-school trained personnel assigned to ship duty. This finding warrants further investigation.

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INTRODUCTION

PROBLEM

One has only to pick up the daily paper, turn to the 10 O'Clock News, or leaf through TIME or Newsweek to be reminded of the Navy's military manpower problems. Recruiters have been hard pressed to meet accession goals despite a downward trend in manning levels (America's Volunteers, 1978). In addition the manpower pool of recruitable personnel is projected to decrease from 15 to 20 percent during the 1980's. A commensurate reduction in Naval strength and missions is not anticipated. Competition for eligible military recruits will as a result become keener (Bowler, 1977).

Reducing first term attrition of personnel once they are recruited could provide help in solving this manpower problem. Navy attrition rates for first-term non prior service (NPS) male recruits increased from 30 percent in 1971 to over 40 percent in 1977 (Lau, 1979).

Considerable research has been conducted on the cause of attrition and the development of methods to reduce it. The bulk of this effort has been focused on traditional individual biographic and demographic data, while excluding post recruitment organizational factors. The issue of attrition might best be explained by combinations of both the traditional and organizational variables.

BACKGROUND

Screening potential recruits for Naval service serves a two-fold purpose. First, it ensures proper input quality, and in the amounts specified by Congress. Secondly, screening is used to predict the chances of an individual not attriting during a first enlistment. During the 1970's, several screening schemes aimed at reducing first term attrition were utilized.

The Odds for Effectiveness-1 (OFE) tables were implemented in 1973 and included as predictor variables: (1) an aptitude (the Armed Forces Qualification Test--AFQT) test score, (2) number of years of school completed, (3) number of expulsions or suspensions from school, and (4) the number of arrests (Plag & Goffman, 1966). Navy recruiters computing an OFE-1 score for each male non prior service applicant experienced increasing difficulty in obtaining arrest information. As a result the Naval Personnel Research and Development Center was requested to formulate a revised OFE table which would not require arrest information. A revised screening table, OFE-2, was produced and then formally implemented in October 1975. It excluded arrest data as a predictor variable (Sands, 1976). In October 1976 a new screening table devised by Robert F. Lockman from the Center of Naval Analysis was placed into use. The predictor variables employed by this screening model were the following: (1) race--majority and minority, (2) mental group devised from AFQT score, (3) age at entry, (4) dependents status, and (5) years of education (Lockman,

1978). The revised screening table currently used by Navy recruiters is presented by Table 1 (Navy Recruiting Manual).

Recent studies have begun to investigate the contribution of organizational variables to first term attrition. Thomason (1979) investigated the effects of recruit training "boot" camp and first duty station assignment as well as the traditional variables of age, education and mental group for various Navy ratings. In an analysis of the Vol Out II program, Smith and Kendall (1980) evaluated the effect of A-school[1] training and duty assignment on first term attrition rates. The Thomason and the Smith and Kendall studies indicated that post-recruitment variables demonstrated a significant relationship with first term survival rate. Smith and Kendall reported that a significantly lower attrition was associated with assignment to sea versus shore duty. They also evaluated the effect of assignment to general ship types within the sea duty category and its resultant impact on attrition rates. Research by Butcher (1980) also noted a reduction in first term attrition when recruits were assigned to sea duty versus shore duty.

The Enlisted Transfer Manual (TRANSMAN) specifies the policies and procedures utilized in assignment of enlisted personnel in the Navy. The assignment of recruits to their

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[1]A-schools are designed to provide a minimum of 4 weeks of technical and skill training in a job specialty aimed at a specific Navy rating (Navy Recruiting Manual).

TABLE 1

Success Chances for Recruits Entering the Navy (Screen)

		P	Q	R	S	T	V	W	X	
GRADE		MORE Than 12		12		11		Less Than 11		
Dependent Status		No Dep	Dep	No Dep	Dep	No Dep	Dep	No Dep	Dep	
AFQT	Age									
95-100	18-19	96	94	95	93	90	87	89	84	
	17	96	94	94	92	90	86	88	83	
	20+	95	93	93	90	88	83	86	80	
67-94	18-19	92	89	90	86	82	76	79	72	
	17	92	88	89	84	81	74	78	70	Minimum SCREEN
	20+	90	86	87	82	78	70	74	66	Eligibility
50-66	18-19	91	87	88	83	79	72	76	68	
	17	90	86	87	82	77	70	74	66	
	20+	88	84	84	79	74	66	70	62	
35-49	18-19	87	82	83	77	72	63	68	59	
	17	86	81	81	75	70	61	66	57	
	20+	83	78	78	71	66	57	62	52	
21-34	18-19	85	79	80	73	68	59	64	55	
	17	84	78	79	72	66	57	62	53	
	20+	81	74	75	68	62	52	57	48	

NOTE 1: An applicant with an AFQT Range of 20 or less may not be enlisted.

first non-training duty station may be divided into three sections: (1) A-school graduates, (2) general detail (GENDET)[2] personnel, or (3) "immediate availables". Immediate availables are comprised of A-school dropouts and personnel returning from medical treatment or confinement.

The Navy Military Personnel Command (NMPC) controls the assignment of A-school graduates. The GENDET and "immediate available" personnel are assigned by the Enlisted Personnel Management Center (EPMAC). All assignments are regulated by the manning control authorities (MCA) which determine equitable and required manning levels for all Naval commands. The MCA's are NMPC, Commander-in-Chief Pacific Fleet and Commander-in-Chief Atlantic Fleet. Among them they determine the quantity and quality (paygrade and NEC[3]) manning levels for their commands based on the "fair share" Navy Manning Plan (NMP). Personnel replacement requisitions are originated by the individual commands prioritized by the MCA guidelines, and filled by NMPC or EPMAC detailers. Article 3.02 of the TRANSMAN delineates assignment policy:

---

[2]GENDETS are recruits who attend Apprenticeship School for Seaman, Fireman, or Airman instead of A-school after completing recruit training. Apprenticeship training is approximately a 2 to 3 week program which prepares personnel for general (unskilled or semi-skilled) fleet assignments (Guthrie, Lakota, & Matlock, 1978).

[3]Naval enlisted classification codes (NEC) supplement the enlisted rating structure and denote specific skill training within a rating or ratings. They are subdivided into primary (PNEC) or secondary (SNEC) for manpower management purposes (NAVPERS 18068).

> In discharging the responsibilities assigned to them by higher authority, Assignment Control Authorities shall adhere to the following policies pertaining to the assignment of enlisted members and neither race, creed nor color, national origin, nor sex, except where prohibited by 10 U.S. Code 6015, shall be factors in the nomination and assignment of naval personnel.

Article 3.23 addresses non-prior service recruit personnel assignments:

> Every effort will be made to assign first term personnel to sea duty. It is recognized that this is not possible in all ratings/NEC's; however it is the goal for all ratings. First term personnel having active duty obligation of 4 years or less and assigned to sea duty will normally remain at sea for their entire initial enlistment. In those ratings NEC's where no valid requirement exists at sea, member will be assigned a PRD[4] ashore to coincide with EAOS.[5] In those cases where personnel must be assigned an initial shore tour due to requisition requirements, an 18-24 month special shore tour will be assigned to be followed by a sea assignment, providing member has a minimum of 12 month obligated service remaining.

The recruit does have the opportunity to make an input to the system which assigns or details him to his first duty station. GENDET personnel are allowed to request location only. They are given a form to fill out which lists available choices and the odds of actually receiving that selection. A-school graduates and immediate availables are allowed to request type of ship as well as location. The preferences for all individuals are reviewed by the enlisted detailers when filling the personnel requisitions. Individual assignments

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[4]PRD--Prospective rotation date.

[5]EAOS--Expiration of active obligated service.

are then made based on the individuals training qualifications, and the priorities and guidelines of the MCA's. The individuals preferences are honored where feasible (TRANSMAN). Hoehn, Wilson, and Richards (1972) described the military as doing a fairly successful job of meeting individuals' assignment preferences and as benefiting from the higher overall satisfaction which resulted.

In a speech at the Naval Postgraduate School in November 1980, Admiral Conrad, Assistant Commander of NMPC for Distribution, stated that due to reduced fleet manning the detailing system currently had less flexibility to meet individual duty preferences than it had formerly.

PURPOSE

The first objective of this thesis was to compare the characteristics and attrition rates of those first term personnel assigned to sea duty as sailors aboard ships or submarines with those assigned to other duty stations. The second objective was to evaluate traditional and non-traditional variables as predictors of first term attrition. Personnel and organizational factors were analyzed in an attempt to identify methods to screen first termers for assignment to various vessels where they would have the best chance not to attrite.

METHOD

SAMPLE

The cohort selected for analysis was defined by the following parameters:

1. Non-prior service (NPS).[1]
2. Male only.
3. First term enlistees.
4. Term of enlistment from 3 to 6 years.
5. Active Duty started in last quarter of fiscal year (July, August, September).

Individuals who were sworn into the Navy but whose commencement of active duty was delayed under the auspices of the Delayed Entry Program (DEP) are classified as prior service personnel by the Enlisted Master Record. People participating in the DEP program are therefore not included in the sample.

PROCEDURE

The Enlisted Survival Tracking File (STF) produced by the Naval Personnel Research and Development Center (NPRDC) was utilized as the data base for the longitudinal analysis. Development of the STF was begun by the Bureau of Naval Personnel in 1975. In 1977 NPRDC and Pers 35-b (now NMPC-164)

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[1]Non-prior service signifies that the recruit has not served previously in the United States military.

collaborated jointly to complete development of the data base. The STF consists of two separate collections of records. Only the first, the longitudinal STF (STF-L) was utilized for this research effort. It consists of an 120 character field length record which represents the status of each individual at quarterly intervals. The data utilized in the construction of the file is derived from the end of quarter Enlisted Master Record (EMR) file and the quarter audittrail file; both of which are routinely prepared by NMPC-165. The STF-L file contains records commencing with the fourth quarter of the fiscal year 1977 and contains a complete longitudinal description for those personnel who enlisted that quarter or later. For individuals enlisting prior to that time, data are available only from that date forward. A completely new record is generated for a person who has a status change during any quarter on one or more of the variables. An individual therefore might have a record for each quarter of service. If no change occurs in a quarter, the quarter count variable is incremented indicating the number of quarters the record has remained unchanged. A complete listing of the STF-L data elements is located in Appendix A (Borack & Gay, 1980).

A ship data bank was then developed starting with a Unit Identification Code (UIC) tape supplied by NMPC-47. The UIC tape contains the UIC, hullnumber, name, homeport, and type activity code (TAC) for every activity in the Navy. Punch

cards with the data from the tape were produced for each ship in the fleet. Then data pertaining to the ship type, class, subclass, size (based on personnel), age (based on commissioning date), engineering plant, nuclear capable status, homeport location, and active or reserve status were added to each ship's card.

Fourteen variables were then selected from the 48 available on the STF-L file records of each individual to form one composite record per person. This was accomplished utilizing a FORTRAN program which did the following:

1. If an actual onboard UIC on an individual's records through the third quarter of fiscal year 1978[2] matched a UIC from the ship data bank all variables except losscode and lossdate were read from the first record the ship UIC appeared on. A new data element (ship (1) or non-ship (2) (see below)) was used and a data element failure (1) or success (2) was created and coded failure if a losscode appeared. Finally a lossgroup data element was added for loss before 1 July 1978 (1) or later (2).

2. If an individual's records did not contain a ship UIC by the fourth quarter of fiscal year 1978 all variables except losscode and lossdate were pulled from the third quarter fiscal year 1978 record. If that record didn't exist, the next

---

[2]The end of the third quarter of FY 78 was chosen to give the first-termer time to complete training enroute to his first duty station. A minimum of nine and maximum of twelve months depending on active duty start date would be available.

preceding one was utilized. The composite record was then annotated with the code for non-ship. Losscode and lossdate were added if applicable from the last record. Success or failure and lossgroup data elements were computed as before.

3. The active duty start date (ADSD) was extracted from the first STF-L record of each individual for the composite record.[3]

4. The active duty start date (ADSD) and date of birth (DOB) which were year and month--four digit variables--divided into two digit variables for year (ADSYR + DOBYR) and month (ADSDMTH + DOBMTH).[4]

The composite record for each individual was then combined as applicable with the ship data file by matching UIC's. This yielded the merged file which was utilized for all data analysis. A description of the merged file is found in Appendix B. A description of the UIC and ship variable files is found in Appendix C.

The age at entry (AGEYRS) in months for each individual from date of birth and active duty start date variable was computed using the format presented in Appendix D. Total

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[3]The ADSD was changed for individuals who had lost service time for desertion on their subsequent quarterly update. A decision to use the original ADSD was made to compute age at entry properly.

[4]Date of birth and active duty start date variables were each separated into year and month to enable computation of age at entry (AGEYRS) and total active service (TAS) variables.

active service (TAS) for each first termer was computed from active duty start date and lossdate year and month variables. Format for computation of TAS is also presented in Appendix D.

CONSTRAINTS

The major constraint was the exclusion of DEP personnel due to their prior-service classification. Women were not included in the cohort based on their small actual number, and the fact that a low percentage of that total go to sea duty aboard ships. The STF-L file had been updated through the third quarter of FY 80 at the time of this research, limiting the maximum total active service for an individual to 36 months. The fact that changes could occur at any time during a quarter, but were only recorded at the end of a quarter, is a weakness inherent with most longitudinal data banks and must be takne into account. The lack of timeliness in data submission could also cloud the statistical accuracy of the file as events occurring toward the end of the quarter might not be identified until the next quarter's update. Although the data for this particular cohort cover a 3 month period it cannot be construed to exactly represent the full year's input to the Navy. Significant seasonal differences in recruit cohort characteristics have been determined in previous research (Grismer, 1976). The ship variables "class" and "subclass" were not utilized as they subdivided the data into cell sizes that were too small for analysis. They are described in the ship variable description

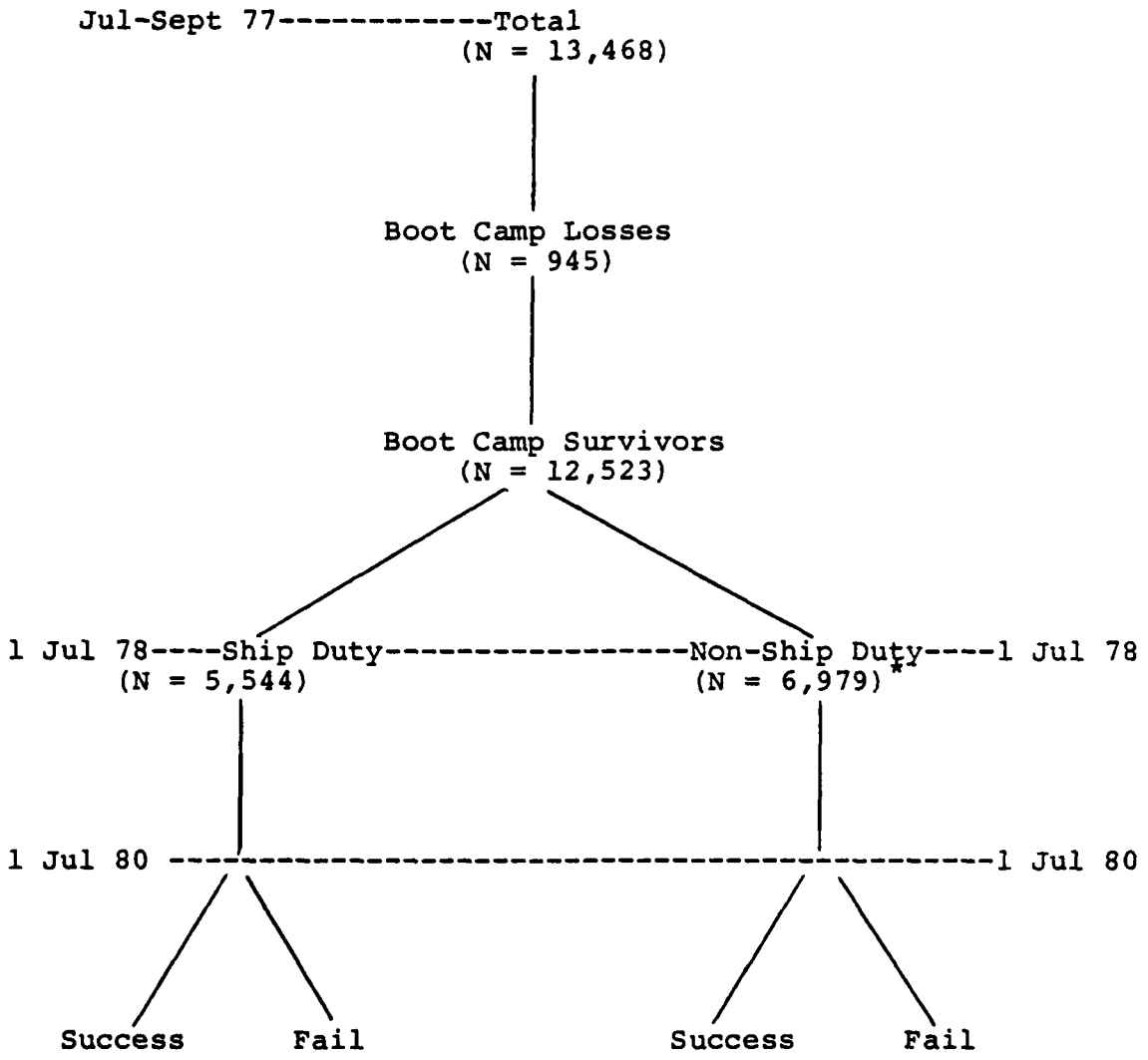
in Table 3 and Appendix E for possible future research effort.

ANALYSES

The total cohort (N = 13,468) was divided into four subgroups to enable different statistical comparisons. Those individuals who attrited during their initial three months of active duty (N = 945) were identified and labeled "Boot Camp Losses". The remaining cohort (N = 12,523) was labeled "Boot Camp Survivors" or BCS. The BCS group was subdivided into those individuals who went to ships "Ship" prior to 1 July 1978 (N = 5,544) and those who went to duty stations other than ships "Non Ship" prior to 1 July 1978 (N = 6,979). The cohort breakdown is illustrated in Figure 1. The four distinct groups were evaluated based on traditional variables (e.g., race, age at entry) and non-traditional or organizational (e.g., training, duty assignment) variables. Attrition rates for the various groups and variables within groups were examined. Both traditional and non-traditional variables were used in an attempt to predict attrition in the four largest groups.

DATA ANALYSIS

The cohort data were statistically processed using programs from the Statistical Package for the Social Sciences--SPSS (Nie, Hull, Jenkins, Steinrenner, & Bent, 1975). Frequencies were computed fro total numbers of cohort members,



*Refer to Chapter 3--Findings

Figure 1. Cohort Subdivisions

the number attriting, and the number surviving for traditional and non-traditional variables.

Multiple linear regression was utilized in an attempt to evaluate the impact of variables in predicting attrition rates. Analysis was performed using the traditional variables proposed by Lockman (1976), Sands (1976) and others. These variables described in Table 2 included race, AFQT, years of education, and age at entry. A decision was made not to use primary dependent status as a variable due to a large number of missing cases on the STF-L file. The Non-traditional variables of A-school status and ship type assignment identified by Smith and Kendell (1980) were also added to the regression equation. Finally, the variables specific to ships were entered into the regression equation. The non-traditional variables are described in Table 3.

TABLE 2

Definition of Traditional Variables

Variable	Definition
AGEYRS	Age at active duty start date
EDUCYRS	Years of education completed prior to enlistment
RACE	Caucasian or Minority
AFQT	Score on Armed Forces Qualification Test, from 00 to 99

TABLE 3

Definition of Non-Traditional or Organizational Variable

Variable	Definition
ASCHIND	A-school status (either school or GENDET)
SHIP	Assigned to a ship for a duty assignment (or not)
TYPESHIP	Type of ship assignment (refer to Appendix E for a complete description of this and all following variables)
CLASS	Class of ship assigned
SUBCLASS	Subclass of ship assigned if applicable
SIZE	Size of ship assigned based on number of personnel
AGE	Age of ship assigned based on commissioning date
ENGPLANT	Engineering plant type of ship assigned
NUCCAP[1]	Whether the ship assigned is nuclear capable or not
LOCATION	Location area of ship assigned
ACTNRF	Active (or Reserve) status of ship assigned

[1]Nuclear capable is term used to describe ships which have the ability to carry nuclear weapons. It does not signify the presence of nuclear weapons aboard a specific ship.

FINDINGS

COHORT DISTRIBUTION

The first examination of the cohort data concerned the distributions of individuals based on the traditional variables of race, ethnic group,[1] age at entry, mental group, and years of education. The frequencies for these variables are listed by cohort group in Tables 4 through 7.

Mental groups were defined in terms of AFQT scores as follows:

Mental Group I	AFQT 93+
Mental Group II	AFQT 65-92
Mental Group III Upper	AFQT 49-64
Mental Group III Lower	AFQT 31-48
Mental Group IV or Below[2]	AFQT 01-30

The years of education variable was split into two categories. Those individuals with less than 12 years of education completed were termed non-high school graduates (NHSG). Those individuals with 12 years or more education completed were termed high school graduates (HSG).

The total cohort broken down by traditional variables is shown in Table 4. At entry, 18 year olds comprised the largest group--39.3 percent. Mental group III (Upper) was the most prevalent mental category of the cohort obtaining

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[1]Ethnic group, although not a traditional variable, was included here due to its relationship with race.

[2]There were some individuals in the cohort who had AFQT scores lower than the mental group IV minimum.

TABLE 4

Distribution of the Total Cohort by Traditional Variables

Subgroup	N	Distribution[a] Within Variable Class
Race		
Caucasian	11026	81.9
Black	1729	12.8
Other	712	5.3
Total	13468	100.0
Ethnic[b]		
Hispanic	571	4.2
Filipino	274	2.0
Age at Entry		
17 Years	3051	22.7
18 Years	5287	39.3
19 Years	2344	17.4
20-22 Years	2059	15.2
$\geq$ 23 Years	727	5.4
Total	13468	100.0
Mental Group Category		
I	721	5.4
II	3539	26.7
III (Upper)	4483	33.8
III (Lower)	4097	30.9
IV (or Below)	430	3.2
Total[c]	13270	100.0
Years of Education		
Non-HSG	6057	45.0
HSG	7409	55.0
Total	13468	100.0

TABLE 4 (CONT.)

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[a]Distribution within variable class is the percentage that each subgroup N represents of the total for the variable (e.g.,--Caucasian, 11,026 ÷ 13468 = 81.9%)

[b]Only Hispanic and Filipino ethnic groups had a significant number of individuals. Percent is of total cohort.

[c]Mental Group missing observations = 198.

TABLE 5

Representativeness of Personnel Losses During Boot Camp and Their Distribution by Traditional Variables

Subgroup	N Lost	Distribution Within Variable Class	Representativeness[a] of Total Subgroup Population
Race			
Caucasian	752	79.6	6.8
Black	153	16.2	8.8
Other	40	4.2	5.6
Total	945	100.0	7.0
Ethnic			
Hispanic	31	N/A	5.4
Filipino	7	N/A	2.6
Age at Entry			
17 Years	258	27.3	8.5
18 Years	296	31.3	5.6
19 Years	192	20.3	8.2
20-22 Years	143	15.2	6.9
≥ 23 Years	56	5.9	7.7
Total	945	100.0	7.0
Mental Group Category			
I	10	1.1	1.4
II	140	14.9	4.0
III (Upper)	300	31.9	6.7
III (Lower)	437	46.5	10.7
IV (or Below)	52	5.5	12.1
Total	945	100.0	7.0
Years of Education			
Non-HSG	578	61.2	9.5
HSG	367	38.8	5.0
Total	945	100.0	7.0

[a]The subgroup N lost (first two columns) represents a percentage of the total subgroup N. Total subgroup is all individuals in the same subgroup category for the original 13,468 cases (e.g.,--Caucasian 752 ÷ 11026 [Table 4] = 6.8%)

TABLE 6

Representativeness of Boot Camp Survivor Personnel Assigned to Ship Duty and Their Distribution by Traditional Variables

Subgroup	N	Distribution Within Variable Class	Representativeness Of Total[a] Subgroup Population	Representativeness Within[b] Boot Camp Survivors
Race				
Caucasian	4397	79.3	39.9	42.7
Black	796	14.4	46.0	50.7
Other	351	6.3	49.3	52.6
Total	5544	100.0	41.2	44.6
Ethnic				
Hispanic	260	N/A	45.5	48.4
Filipino	146	N/A	53.3	54.7
Age at Entry				
17 Years	1366	24.6	44.8	48.9
18 Years	2177	38.2	41.2	43.6
19 Years	956	17.2	43.7	44.4
20-22 Years	824	14.9	40.0	43.0
≥ 23 Years	281	5.1	38.7	41.9
Total	5544	100.0	41.2	44.3
Mental Group Category[c]				
I	121	2.2	16.8	17.0
II	1172	21.5	33.1	34.5
III (Upper)	1948	35.7	43.5	46.6
III (Lower)	1975	36.2	48.2	54.0
IV (or Below)	233	4.3	54.2	61.6
Total	5449	100.0	40.5	43.5
Years of Education				
Non-HSG	2666	48.1	44.0	48.7
HSG	2878	51.9	38.8	40.9
Total	5544	100.0	41.2	44.3

TABLE 6 (CONT.)

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[a]The subgroup N (first two columns) represents a percentage of the total subgroup N. Total subgroup is all individuals in the same subgroup category for the original 13,468 cases (e.g.,--Caucasian 4397 ÷ 11026 (Table 4) = 39.9%).

[b]The subgroup N (first two columns) represents a percentage of the total BCS subgroup N. BCS total subgroup is all individuals in the same subgroup category for the 12,523 BCS cases (e.g.,--Caucasian 4397 ÷ 10274 = 42.7%).

[c]Mental Group missing observations = 95.

TABLE 7

Representativeness of Boot Camp Survivor Personnel Assigned to Non-Ship Duty and Their Distribution by Traditional Variables

Subgroup	N	Distribution Within Variable Class	Representativeness	
			Of Total Subgroup Population	Within Boot Camp Survivors
Race				
Caucasian	5802	84.2	52.6	56.8
Black	772	11.2	44.7	49.3
Other	316	4.6	44.4	47.3
Total	6890	100.0	51.2	55.4
Ethnic				
Hispanic	277	N/A	48.5	51.6
Filipino	121	N/A	44.2	45.3
Age at Entry				
17 Years	1425	21.4	46.7	51.1
18 Years	2794	41.6	52.8	56.4
19 Years	1189	17.1	50.7	55.6
20-22 Years	1087	15.6	52.8	57.0
≥ 23 Years	395	5.3	54.3	58.1
Total	6890	100.0	51.2	55.0
Mental Group Category[a]				
I	585	8.6	81.1	82.3
II	2190	32.2	61.9	65.5
III (Upper)	2202	32.4	49.1	52.6
III (Lower)	1673	24.6	40.8	45.7
IV (or Below)	144	2.1	33.5	38.1
Total	6794	100.0	50.4	54.3
Years of Education				
Non-HSG	2773	40.2	45.8	51.8
HSG	4117	59.8	55.6	59.1
Total	6890	100.0	51.2	55.0

[a]Mental Group missing observations = 96

AFQT scores in that category, with 33.8 percent. The figure of 55 percent for high school graduates is well below reported Navy recruiting statistics for the year (America's Volunteers, 1978). This is probably due to the expulsion of delayed entry personnel who are more likely to be awaiting A-school training.

Characteristics of individuals lost during recruit training are displayed in Table 5. Losses during the first three months of active duty were 7 percent for the total cohort. Blacks had nearly 9 percent attrition as a group. The "Other" category had the least losses with both Hispanic and Filipino ethnic groups having lower than average attrition rates. As found by previous research, the loss rate increased with lower AFQT scores, with Group IV having over eight times the loss rate. Group I and Group III (Lower) had over twice the loss rate of Group II. The non-high school graduate loss rate was nearly double the rate of the high school graduates.

Boot camp survivors who are assigned to ship sea duty as their first duty assignment are described in Table 6. Those personnel assigned to non-ship sea duty are shown in Table 7. By 1 July 1978, approximately 44 percent of the boot camp survivors had been assigned to ships. (The reader is reminded that active duty for all individuals in the cohort started in the period 1 July-30 September, 1977.) Prior to 1 July 1978, individuals who had attrited from the Navy while attending A-school totaled 89. These individuals were not included

in the boot camp survivor non-ship duty cohort as they had attrited prior to arriving at their first non-training duty station. This reduced the BCS Non-ship cohort to N = 6890.

Some interesting comparisons between Tables 6 and 7 were noted. More blacks and "others" go to sea aboard ships than whites. Filipinos are the most ship duty prone group with nearly 55 percent being assigned. The older a first termer was the greater was his likelihood for non-ship duty. The most interesting phenomenon was the extremely low percent of Mental Group I and II individuals assigned to shipboard duty. Nearly five times as many Mental Group I's went to non-ship duty as to ship duty. In direct contrast, the lowest two mental groups had more people going to ship duty than non-ship duty.

Non-traditional variables were the second area of cohort distribution evaluated. Variables considered for the "BCS" cohort were A-school indication and ship or non-ship duty assignment; data for the variables are shown on Table 8. Approximately 45% of the cohort had completed or was due to complete A-school training. Over one half of the cohort remained as GENDET personnel. This ratio is unlike the 65% A-school graduate to 35% GENDET ratio which was found for the control group in the study by Smith and Kendall, 1980. It is presumed that the omission of delayed entry personnel from the sample was partially responsible for the lower percentage of A-school attendance.

TABLE 8

Distribution of the Boot Camp Survivor Cohort
by Non-Traditional Variables

Subgroup	N	Distribution Within Variable Class
	A-School Attendance[a]	
Graduates	5441	43.8
Dropouts	0	0.0
Attending	133	1.1
Slated	8	0.1
Striker[b]	399	3.2
GENDET	6435	51.8
Total	12416	100.0
	Ship/Non-Ship Status	
Ship	5544	44.6
Non-Ship	6890	55.4
Total	12434	100.0

[a]A-School Attendance missing observations = 18. Also the 89 cases who attrited while in A-School are not included.

[b]A striker is an individual who has not received formal training in a specific rating prior to arrival at his first duty station. An individual may request permission to "strike" for a rating once there through on-the-job-training and correspondence courses. Passing the advancement exam for Third Class Petty Officer gives the striker the desired rating designation.

Table 9 portrays the distribution of A-school attendance for ship duty and non-ship duty cohorts. Having 44% of the total cohort ships received only 29% of the A-school graduates and nearly 60% of the GENDET's.

Non-traditional variables unique to ship duty are shown in Table 10. A complete definition of ship unique variables is given in Appendix F. Furthermore a complete listing of ship distribution for the ship unique variables is found in Appendix G. The largest percentage of individuals went to sea aboard combatant's with submarines receiving the smallest number. Carriers although few in number (N = 14) received a large percentage of cohort personnel. Medium sized ships (from 200 to 400 personnel) had the largest percentage of the cohort personnel as did ships commissioned during the 1960's. 600 PSI steam engineering plant ships received over half of the cohort and 80% of the cohort was aboard nuclear capable ships. Finally the East Coast had over half of the cohort, although West Coast and Hawaiian ships together patrol the Pacific Ocean.

COHORT ATTRITION

Those personnel who failed to complete their first three months of active duty have already been discussed in the previous section as "Boot Camp Losses" (table 5). Attrition for those individuals successfully completing three months of active service, Boot Camp Survivors, is depicted in Tables 11 and 12.

TABLE 9

Representativeness of Ship and Non-Ship Duty Personnel and Their Distribution by A-School Attendance

Subgroup	N	Distribution Within Variable Class	Representativeness[b] of BCS Subgroup Population
Ship Duty[a] Personnel A-School Attendance			
Graduates	1576	28.5	29.0
Attending	0	0.0	0.0
Slated	5	0.1	62.5
Striker	188	3.4	47.1
GENDET	3770	68.1	58.6
Total	5539	100.0	44.6
Non-Ship Duty[c] Personnel A-School Attendance			
Graduates	3865	56.2	71.0
Attending	133	1.9	100.0
Slated	3	0.0	37.5
Striker	211	3.1	52.9
GENDET	2665	38.8	41.4
Total	6877	100.0	55.5

[a]Ship duty cohort missing observations = 5.

[b]The subgroup N (first two columns) represents a percentage of the total BCS subgroup N. BCS subgroup is all individuals in the same subgroup category for the 12,523 BCS cases (e.g.,--Graduates 1576 ÷ 5441 [Table 8] = 29.0%).

[c]Non-Ship duty cohort missing observations = 13.

TABLE 10

Distribution of Ship Duty Personnel
by Ship Unique Variables

Subgroup	N	Distribution Within Variable Class
Type Ship		
Combatant	1693	30.5
Auxiliary	1485	26.8
Submarine	239	4.3
Carrier	1323	23.9
Amphib	804	14.5
Total	5544	100.0
Ship Size		
Small	351	6.3
Medium	2198	39.6
Large	1359	24.5
Extra Large	1636	29.5
Total	5544	100.0
Ship Age		
1940's	1087	19.6
1950's	1004	18.1
1960's	2112	38.1
1970's	1341	24.2
Total	5544	100.0
Ship Engineering Plant		
Nuclear	566	10.2
1200 PSI Steam	1769	31.9
600 PSI Steam	2836	51.2
Diesel	258	4.7
Gas Turbine	115	2.1
Total	5544	100.0
Nuclear Capable		
Nuclear Capable	4279	77.2
Non-Nuclear Capable	1265	22.8
Total	5544	100.0

TABLE 10 (CONT.)

Subgroup	N	Distribution Within Variable Class
Location		
East Coast	3042	54.9
West Coast	1743	31.4
Overseas	412	7.4
Hawaii	317	6.3
Total	5544	100.0
Active-Reserve Ships		
Active	5242	94.6
Reserve	302	5.4
Total	5544	100.0

TABLE 11

Attrition Rates for Ship Duty Personnel

Subgroup	N Lost	Distribution Within Variable Class	Representativeness[a] Within Ship Duty Subgroup
		Race	
Caucasian	929	81.4	21.1
Black	151	13.2	20.0
Other	61	5.3	17.4
Total	1141	100.0	20.6
		Ethnic	
Hispanic	55	N/A	21.2
Filipino	8	N/A	5.5
		Age at Entry	
17 Years	399	35.0	29.2
18 Years	378	33.1	17.4
19 Years	174	15.2	18.2
20-22 Years	137	12.0	16.6
23 Years	53	4.7	18.9
Total	1141	100.0	20.6
		Mental Group Category[b]	
I	29	2.6	24.0
II	189	16.8	16.1
III(Upper)	449	39.8	23.0
III(Lower)	427	37.9	21.6
IV (or Below)	34	3.0	14.6
Total	1128	100.0	20.6
		Years of Education	
Non-HSG	724	63.5	27.2
HSG	417	36.5	14.5
Total	1141	100.0	20.6
		A-School Attendance	
Graduates	201	17.6	12.8
Slated	0	0.0	0.0
Striker	33	2.9	17.6
GENDET	907	79.5	24.1
Total	1141	100.0	20.6

TABLE 11 (CONT.)

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[a]The subgroup N (first two columns) represents a percentage of the total ship duty subgroup N. Ship duty subgroup is all individuals in the same category for the 5544 ship duty cases (e.g.,--Caucasian 929÷4397 [Table 6] = 21.1%).

[b]Mental Group missing observations = 13.

TABLE 12

Attrition Rates for Non-Ship Duty Personnel

Subgroup	N Lost	Distribution Within Variable Class	Representativeness Within Non Ship Duty Subgroup
Race			
Caucasian	1477	85.1	25.5
Black	189	10.9	24.5
Other	70	4.0	22.2
Total	1736	100.0	25.2
Ethnic			
Hispanic	86	N/A	31.0
Filipino	5	N/A	4.1
Age at Entry			
17 Years	470	27.1	33.0
18 Years	620	35.8	22.2
19 Years	280	16.1	23.5
20-22 Years	254	14.6	23.4
≥ 23 Years	111	6.4	28.1
Total	1736	100.0	25.2
Mental Group Category[a]			
I	111	6.5	20.0
II	435	25.4	19.9
III(Upper)	625	36.4	28.4
III(Lower)	503	29.3	30.1
IV (or Below)	41	2.4	28.5
Total	1715	100.0	25.2
Years of Education			
Non-HSG	918	52.9	33.1
HSG	818	47.1	19.9
Total	1736	100.0	25.2
A-School Attendance[b]			
Graduate	560	32.3	14.5
Stated	1	0.1	N/A
Striker	67	3.9	35.7
GENDET	1102	63.5	41.6
Total	1736	100.0	25.2

TABLE 12 (CONT.)

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[a]Mental Group missing observations = 21.

[b]Losses while attending A-School (N = 89) were removed from the BCS Non-Ship duty cohort.

Loss rates for ship duty assigned personnel are portrayed in Table 11 for Traditional and A-School attendance variables. Blacks and Caucasians had approximately the same attrition rate. Filipino had a loss rate which was only one fourth as great as any other group. 17 year olds with nearly 30 percent attrition, clearly stood out from older first termers. Mental Group III's and IV's had a much better success rate than Group I's and III (Upper)'s. Non-high school graduates had nearly twice the failure rate of high school graduates. Finally the A-School graduate loss rate was approximately half graduate loss rate was approximately half that of the GENDET personnel.

Attrition rates for non-ship duty assigned individuals are described in Table 12 by traditional and A-School attendance variables. Hispanics had a loss rate nearly 6 points higher than the average for the cohort, while the Filipino loss rate was one sixth the average. 17 year olds and persons 23 years or more old had higher attrition rates than the 18 through 22 year old group. Mental group I and II had loss rates of 20 percent, with the other mental groups loss rates approximately 10 percentage points higher. Non-high school graduates once again had an attrition rate nearly double that of the high school graduates. A-School graduates had the lowest attrition rate of any variable subgroup while GENDET personnel, with 41.6 percent loss rate, had the highest.

In comparing attrition rates for ship and non-ship cohorts (Tables 11 and 12) the rates are the same or greater in all

cases for non-ship duty personnel variable subgroups with one exception. Mental group I personnel had a higher attrition rate aboard ships than their non-ship counterparts. The relationships within variable groups are alike for nearly all cases in both cohorts. Individuals 23 years old or older had a significantly higher attrition rate than those who were 18 to 22 years old. There was little difference between the loss rates of both groups in the ship duty cohort. Mental group IV's did better than all other mental groups on ship duty, whereas mental groups I and II had the best success rates ashore. Finally, GENDET's as a group were nearly twice as successful aboard ships as compared to non-ship duty.

Attrition rates by ship specific variable are shown for the ship duty cohort in Table 13. Loss rates by types of ships are approximately the same except for submarine and amphibious ships. The submarine loss rate is nearly half that of the other ship types while amphibious ships had a rate slightly higher than average. Broken down by size the small ship subgroup had the lowest rate followed by carriers. Ship commissioning age subgroups had similar attrition rates with the 1950's subgroup having a slightly higher rate. Nuclear and Diesel categories had the best survival of the engineering plant variables. The nuclear capable variable subgroups were almost exactly the same. Overseas and Hawaii homeports had one third and one half respectively the attrition

TABLE 13

Attrition Rates--Ship Duty Unique Variables

Subgroup	N Lost	Distribution[a] Within Variable Class	Representativeness[b] Within Ship Duty Subgroup
		Type Ship	
Combatant	352	30.9	20.8
Axuiliary	308	27.0	20.7
Submarine	28	2.5	11.7
Carrier	272	23.8	20.6
Amphib	181	15.9	22.5
Total	1141	100.0	20.6
		Ship Size	
Small	51	4.5	14.5
Medium	484	42.4	22.0
Large	270	23.7	19.9
Extra Large	336	29.4	20.5
Total	1141	100.0	20.6
		Ship Age	
1940's	218	19.1	20.1
1950's	226	19.8	22.5
1960's	418	36.6	19.8
1970's	279	24.5	20.8
Total	1141	100.0	20.6
		Ship Engineering Plant	
Nuclear	92	8.1	16.3
1200 PSI	372	32.6	21.0
600 PSI	603	52.8	21.3
Diesel	46	4.0	17.8
Gas Turbine	28	2.5	24.3
Total	1141	100.0	20.6
		Nuclear Capable	
Nuclear	879	77.0	20.5
Non-Nuclear	262	23.0	20.7
Total	1141	100.0	20.6

TABLE 13 (CONT.)

Subgroup	N Lost	Distribution Within Variable Class	Representativeness Within Ship Duty Subgroup
		Homeport Location	
East Coast	644	56.4	21.2
West Coast	396	34.7	22.7
Overseas	52	4.6	12.6
Hawaii	49	4.3	14.1
Total	1141	100.0	20.6
		Active-Reserve Ships	
Active	1068	93.6	20.4
Reserve	73	6.4	24.2
Total	1141	100.0	20.6

[a]Distribution within variable class is the percentage that each subgroup N represents of the total for the variable (e.g.,--Combatant 352 ÷ 1141 = 30.9%).

[b]The subgroup N (first two columns) represent a percentage of the total ship duty subgroup N. Sh-p duty subgroup is all individuals in the same category for the 5544 ship duty cases (e.g.,--Combatants 352 ÷ 1693 [Table 10] = 20.8%).

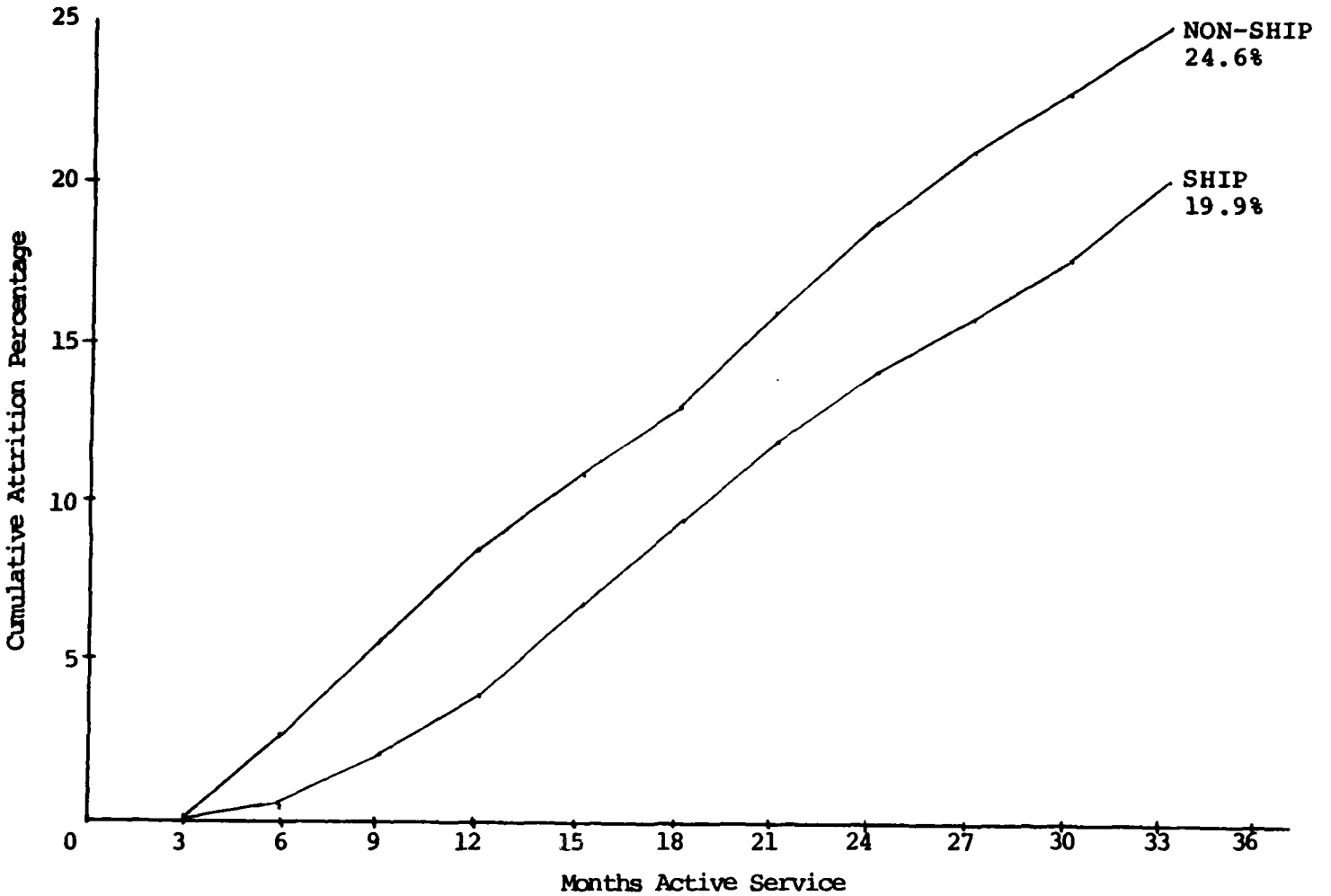

Figure 2. Attrition over Time for Ship and Non-Ship Cohorts (Boot Camp Losses not Included)

rate of the east and west coast ports. Last, reserve ships had 20 percent higher attrition than did active duty ships.

The cumulative attrition over a thirty three month period is graphed in Figure 2 for both ship and non-ship duty cohorts. Non-ship personnel had an attrition rate nearly 20% higher than those personnel assigned to ships. After the 12 month active service point there was little difference in the attrition rate (slope of the lines).

REGRESSION ANALYSIS OF ATTRITION

Regression analyses were undertaken for a twofold purpose. The initial objective was to review and verify findings by previous researchers (Plag, Sands, Lockman) of the effect by traditional variables on attrition. The non-traditional variables of A-School attendance and initial duty assignment evaluated in studies by Smith and Kendall (1980), Butcher (1980), and Thomason (1979) were also included in this review. The second and primary objective involved the inclusion of ship specific variables into the attrition regression equation and evaluation of their impact.

Regression equations were generated for three of the cohort groups: (1) the total cohort, (2) the boot camp survivor cohort, and (3) the ship duty cohort, Tables 15 through 20 present the regression equations and selected statistics for traditional and non-traditional variable combinations with the three cohorts. The definitions of the variables included in the regression analyses for Tables 15 to 18 are

given in Table 14. The zero values in the table represent the average individual to whom all others can be compared in the regression analysis e.g., they are in the constant. Equations were generated for two dependent variables: (1) Success [0,1] and (2) TAS, Total Active Service, a continuous variable ranging from 0 to 36 months.

Regression results utilizing only traditional variables for the total cohort are presented in Table 15. All variables were found to be significant, but they only accounted for 3.38% of the variance in cohort survival. Butcher (1980) obtained a similar proportion of obtained variance using traditiona attrition variables in his research. An additional year of completed education increased survival chances by over 7% and TAS by 1.6 months. A gain of approximately five points on the AFQT score would be expected to yield a 1% higher chance of survival, while being a minority increased survival rate by nearly 2%. The negative coefficient for age at entry indicates approximately a 1% decrease in expected survival for each additional year of age. These findings correspond with the frequency distribution analyses results previously discussed, with the exception of age. The fact that the mid-range age at entry (18-22 years old) subgroups have less attrition than both younger (17 year olds) and older (23 or more) subgroups possibly accounts for the negative coefficient for AGEYRS. Adding the A-School variable to the equation (Table 16) doubles the amount of variance explained by the equations. (McNemar, 1970 states that

TABLE 14

Definitions of Variables Included in Regression Analyses Reported in Tables 15-18

Variable	Definition
Attrition	0--Individual was lost from active duty prior to 1 July 1980 1--Individual remained on active duty as of 1 July 1980
TAS	Total Active Service from 00 to 36 months (continuous dependent variable)
AFQT	Armed Forces Qualification Test score from 00 to 99 (continuous independent variable)
EDUCYRS	Years of education completed from 07 to 22 (continuous independent variable)
MINORITY	0--Individual is a caucasian 1--Individual is a minority
AGEYRS	Age at entry in months from 204 to 360 (continuous independent variable)
ASCHIND	0--Individual is an A-School graduate (N = 5441) or is attending A-School (N = 133) 1--Individual is not an A-School graduate or attending A-School (GENDET N = 6435)
SHIP	0--Individual is assigned to non-ship duty 1--The individual is assigned to a ship

TABLE 15

Stepwise Regression Results for Traditional Variables--Total Cohort[a]

	Attrition "Success-Fail"[b]	Total Active Service "Months"
CONSTANT	.3052	15.1829
	Regression Coefficients	
AFQT	.0018***	.0559***
EDUCYRS	.0718***	1.6121***
MINORITY	.0192*	.4816*
AGEYRS[c]	-.0009***	- .0309***
R^2	.0338	.0323
F Statistic	116.1629***	110.6165***

*Significant at the .10 level

***Significant at the .01 level

[a]Total Cohort N = 13269. This is slightly smaller than the overall cohort, as variables with missing values are not included in the stepwise regression.

[b]The dependent variable is SUCCESS. All variables are defined in Table 14.

[c]Age at entry measured in months.

TABLE 16

Stepwise Regression Results for Traditional Variables Plus A-School Attendance--Total Cohort[a]

	Attrition "Success-Fail"	Total Active Service "Months"
CONSTANT	.3722	25.6777
	Regression Coefficients	
AFQT	-.0009***	-.0154***
EDUCYRS	.0557***	1.1495***
MINORITY	.0196*	.4926*
AGEYRS[b]	-.0005***	-.0194***
ASCHIND[c]	-.2326***	-6.4515***
R^2	.0852	.0979
F Statistic	247.0078***	287.6247***

*Significant at the .10 level

***Significant at the .01 level

[a]Total Cohort N = 13251 due to missing cases.

[b]Age at entry measured in months.

[c]1 = GENDET, 0 = A-School graduate or attending A-School.

TABLE 17

Stepwise Regression Results for Traditional Variables Plus A-School Attendance and Ship/Non-Ship Duty Assignment--Total Cohort[a]

	Attrition "Success-Fail"	Total Active Service "Months"
CONSTANT	.2269	21.4060
	Regression Coefficients	
AFQT	---	---
EDUCYRS	.0562***	1.1965***
MINORITY	.0184*	.3554*
AGEYRS[b]	-.0004***	-.0159***
ASCHIND	-.2695***	-7.7491***
SHIP	.2131***	6.8153***
R^2	.1351	.1826
F Statistic	413.8868***	493.1711***

*Significant at the .10 level

***Significant at the .01 level

---Variable not in the equation (not significant)

[a]Total Cohort N = 13251

[b]Age at entry measured in months

TABLE 18

Stepwise Regression Results for Traditional Variables Plus A-School Attendance and Ship/Non-Ship Duty Assignment--Boot Camp Survivor Cohort[a]

	Attrition "Success-Fail"	Total Active Service "Months"
CONSTANT	.3125	27.1918
	Regression Coefficients	
AFQT	-.0007***	-.0165***
EDUCYRS	.0477***	.7729***
MINORITY	---	.4781***
AGEYRS[b]	---	-.0098***
ASCHIND	-.1864***	-4.0988***
SHIP	.1156***	2.7047***
R^2	.0644	.0702
F Statistic	211.7815***	154.8443***

***Significant at the .01 level

---Variables not in the equation (not significant)

[a]Boot Camp Survivor Cohort N = 12312. This is 211 cases smaller than the actual boot camp survivor cohort as personnel with missing variable values are dropped from the regression equation.

[b]Age at entry measured in months

comparisons of adjusted R^2 values from using forward stepwise regression should be treated with caution; the reader is urged to consider this caveat.) The fact that an individual was not an A-School graduate decreased expected survival by over 23%, and reduced his predicted total active service life by nearly 6.5 months. The effect of the addition of the duty assignment variable, ship or non-ship, to the attrition regression equations is shown in Table 17. Assignment to a ship increases the expected survival rate by over 21% as compared to those not assigned to ships and adds nearly seven months to expected active service. This corresponds with the positive effect Smith and Kendall (1980) reported for sea duty assignment.

When the total cohort group was modified by selecting out boot camp losses, the attrition prediction regression equations (shown in Table 18) were drastically changed. The amount of variance explained (R^2) was cut in half, and the impacts of the A-School attendance and duty assignment variables were significantly reduced. This seems directly attributable to the fact that the previous regression equations (Tables 15-17) took into account boot camp attrition. The change in the total active service equation for the ASCHIND variable was approximately 3 months, which corresponds to the amount of time spent in boot camp.

Ship unique variables were next entered into the regression as shown in Table 20. Table 19 defines the variables used to derive the equations for that table. The maximum increase

TABLE 19

Definitions of Variables Included in Regression.
Results shown in Table 20

Variable	Definition
Attrition	0--Individual was lost from active duty prior to 1 July 1980 1--Individual remained on active duty as of 1 July 1980
TAS	Total Active Service from 0 to 36 months (continuous dependent variable)
AFQT	Armed Forces Qualification Test score from 00 to 99 (continuous independent variable)
MINORITY	0--Individual is a caucasian 1--Individual is a minority
AGEYRS	Age at entry in months from 204 to 360 (continuous independent variable)
ASCHIND	0--Individual is an A-School graduate or is attending A-School 1--Individual is a GENDET (Not an A-School graduate or attending A-School)
TYPESHIP 1 (Combatant)*	0--Individual is not assigned to a combatant 1--Individual is assigned to a combatant
TYPESHIP 2 (Auxiliary)*	0--Individual is not assigned to an auxiliary ship 1--Individual is assigned to an auxiliary ship
TYPESHIP 3 (SUB)*	0--Individual is not assigned to a submarine 1--Individual is assigned to a submarine
TYPESHIP 4 (Carrier)*	0--Individual is not assigned to a carrier 1--Individual is assigned to a carrier
TYPESHIP 5 (Amphib)*	0--Individual is not assigned to an amphibious ship 1--Individual is assigned to an amphibious ship

NUCCAP*	0--Individual is not assigned to a nuclear capable ship 1--Individual is assigned to a nuclear capable ship
Non-NUCCAP*	0--Individual is assigned to a nuclear capable ship 1--Individual is not assigned to a nuclear capable ship
SIZE 1 (Small)*	0--Individual is not assigned to a small ship 1--Individual is assigned to a small ship
SIZE 2 (Medium)*	0--Individual is not assigned to a medium ship 1--Individual is assigned to a medium ship
SIZE 3 (Large)*	0--Individual is not assigned to a large ship 1--Individual is assigned to a large ship
SIZE 4 (Extra Large)*	0--Individual is not assigned to an extra large ship 1--Individual is assigned to an extra large ship
ENGPLANT 1 (Nuclear)*	0--Individual is not on a ship with a nuclear engineering plant 1--Individual is on a ship with a nuclear engineering plant
ENGPLANT 2 (1200 PSI)*	0--Individual is not on a ship with a 1200 PSI steam plant 1--Individual is on a ship with a 1200 PSI steam plant
ENGLANT 3 (600 PSI)*	0--Individual is not on a ship with a 600 PSI steam plant 1--Individual is on a ship with a 600 PSI steam plant
ENGPLANT 4 (Diesel)*	0--Individual is not on a ship with a diesel plant 1--Individual is on a ship with a diesel plant
ENGPLANT 5 (Gas Turbine)*	0--Individual is not on a ship with a gas turbine plant 1--Individual is on a ship with a gas turbine plant

AGE 1 (1940's)*	0--Individual is not on a ship commissioned in the 1940's 1--Individual is on a ship commissioned in the 1940's
AGE 2 (1950's)*	0--Individual is not on a ship commissioned in the 1950's 1--Individual is on a ship commissioned in the 1950's
AGE 3 (1960's)*	0--Individual is not on a ship commissioned in the 1960's 1--Individual is on a ship homeported in the 1960's
AGE 4 (1970's)*	0--Individual is not on a ship commissioned in the 1970's 1--Individual is on a ship commissioned in the 1970's
LOCATION 1 (East Coast)*	0--Individual is not assigned to a ship hompeorted on the east coast 1--Individual is assigned to a ship homeported on the east coast
LOCATION 2 (West Coast)*	0--Individual is not on a ship homeported on the west coast 1--Individual is on a ship homeported on the west coast
LOCATION 3 (Overseas)*	0--Individual is not on a ship homeported overseas 1--Individual is on a ship homeported overseas
LOCATION 4 (Hawaii)*	0--Individual is not on a ship homeported in Hawaii 1--Individual is on a ship homeported in Hawaii

*The non-ship personnel are coded [0,0] as a dummy variable.

TABLE 20

Stepwise Regression Results for Traditional and Non-Traditional Variables--Boot Camp Survivor Cohort[a]

	Attrition "Success-Fail"	Total Active Service "Months"
CONSTANT	.3131	27.2035
	Regression Coefficents	
AFQT	-.008***	-.0168***
EDUCYRS	.0475***	.7707***
MINORITY	---	.4686***
AGEYRS[b]	---	-.0099***
ASCHIND	-.1847***	-4.1225***
NUCCAP	.1037***	2.5789***
Non-NUCCAP	.1180***	2.7635***
Location 3 (Overseas)	.0774***	1.2991***
Location 4 (Hawaii)	.0460***	---
ENGPLANT 4 (Diesel)	---	1.086**
R^2	.0654	.0710
F Statistic	123.1183***	94.1428***

**Significant at the .05 level

***Significant at the .01 level

---Variables not in the equation (not significant)

[a]Boot Camp Survivor Cohort N = 12330

[b]Age at entry measured in months

in variance explained overthe BCS cohort (Table 18) was .008 for the total active service equation. The nuclear and non-nuclear capability variables showed a significant positive effect in the equation. Both overseas and Hawaii location assignments also had positive effects on expected survival. Diesel engineering plant entered the equation for TAS at a significant level.

Finally, ship unique variables were evaluated as predictors of attrition for the cohort of personnel assigned to ships. The resultant attrition equations and related statistics are given in Table 22. The variables used in Table 22 are defined in Table 21. The variance explained by ship unique variables was extremely small (.56% for survival and .78% for total active services). Assignment to an overseas homeported ship, a submarine, or to ships with nuclear or diesel engineering plants, all had a positive effect on survival chances. These results correspond with the data presented in the frequency distribution analyses. Personnel who are assigned to overseas duty are pre-screened prior to assignment in accordance with Chapter 4 of the Enlisted Transfer Manual. This may be responsible for the lower attrition rates experienced by that group. It is important to note that the variables describing ship size, age, active or reserve status, and nuclear capability were not significant enough to be entered into either equation.

TABLE 21

Definition of Variables Included in Regression Analyses for Table 22 Results

Variable	Definition
TYPESHIP 2 (Auxiliary)	0--Individual not assigned to an auxiliary ship 1--Individual assigned to an auxiliary ship
TYPESHIP 3 (Sub)	0--Individual not assigned to a submarine 1--Individual assigned to a submarine
TYPESHIP 4 (Carrier)	0--Individual not assigned to a submarine 1--Individual assigned to a submarine
TYPESHIP 5 (Amphib)	0--Individual not assigned to an amphibious ship 1--Individual assigned to an amphibious ship
SIZE 1 (Small)	0--Individual not on a small ship 1--Individual on a small ship
SIZE 3 (Large)	0--Individual not on a large ship 1--Individual on a large ship
SIZE 4 (Extra Large)	0--Individual on an extra large ship 1--Individual not on an extra large ship
AGE 1 (1940's)	0--Individual not on a ship commissioned in the 1940's 1--Individual on a ship commissioned in the 1940's
AGE 2 (1950's)	0--Individual not on a ship commissioned in the 1950's 1--Individual on a ship commissioned in the 1950's
AGE 4 (1970's)	0--Individual not on a ship commissioned in the 1970's 1--Individual on a ship commissioned in the 1970's

ENGPLANT 1 (Nuclear)	0--Individual not on a ship with a nuclear power plant 1--Individual on a ship with a nuclear power plant
ENGPLANT 2 (1200 PSI)	0--Individual not on a ship with a 1200 PSI steam plant 1--Individual on a ship with a 1200 PSI steam plant
ENGPLANT 4 (Diesel)	0--Individual not on a ship with a diesel power plant 1--Individual on a ship with a diesel power plant
ENGPLANT 5 (Gas Turbine)	0--Individual not on a ship with a gas turbine power plant 1--Individual on a ship with a gas turbine power plant
NUCCAP	0--Individual not on a nuclear capable ship 1--Individual on a nuclear capable ship
LOCATION 2 (West Coast)	0--Individual not on a ship home-ported on the west coast 1--Individual on a ship home-ported on the west coast
LOCATION 3 (Overseas)	0--Individual not on a ship home-ported overseas 1--Individual on a ship home-ported overseas
LOCATION 4 (Hawaii)	0--Individual not on a ship home-ported in Hawaii 1--Individual on a ship home-ported in Hawaii

TABLE 22

Stepwise Regression Results for Ship Unique Variables--Ship Duty Cohort[a]

	Attrition "Success-Fail"	Total Active Service "Months"
CONSTANT	.7832	32.4091
	Regression Coefficients	
LOCATION 3 (Overseas)	.0901***	1.7706***
TYPESHIP 3 (Sub)	.0989***	1.0890***
ENGPLANT 1 (Nuclear)	---	1.0284***
ENGPLANT 4 (Diesel)	---	.8915**
R^2	.0056	.0078
F Statistic	15.5206***	10.8613***

**Significant at the .05 level

***Significant at the .01 level

---Variables not in the equation

[a]Ship Duty Cohort N = 5543

CONCLUSIONS AND RECOMMENDATIONS

INTRODUCTION

This study had two primary objectives. The first was to compare the characteristics and attrition rates of first term personnel initially assigned to ships with those assigned to other duty stations. The second objective was to evaluate traditional (e.g., AFQT, age at entry, education) and non-traditional (e.g., A-School training, duty assigned, home-port variables as predictors of first term attrition, with emphasis placed on variables which were ship unique (e.g., *shiptype, age, size, engineering plant*).

COHORT DISTRIBUTION

Overall, 45% of the cohort who survived their first three months of active duty (Boot Camp Survivors--BCS) were initially assigned to ships. The remaining personnel (55%) were assigned to non-ship duty stations (Tables 6 and 7). The ship duty cohort did not include a representative mental group mix. Only 17% of mental group I and 34.5% of mental group II personnel were assigned to ships. Ships received 54% of the mental group III-lower and 61.6% of the mental group IV-or below[1] personnel. Closely related to this finding was the fact that ships received only 29% of the A-School graduates

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[1]The total cohort contained a small number of personnel whose AFQT scores placed them below the mental group IV minimum.

in the cohort (Tables 8 and 9). Minorities (51% of the minority personnel in the BCS cohort) and younger individuals--those who were 17 years old at active duty commencement (48.9%) were also over represented in the ship duty cohort. The under representation of upper mental group and A-School trained personnel assigned to ship duty should be thoroughly investigated to determine the causes and justifications for this assignment practice.

COHORT ATTRITION

Blacks as a group had greater attrition (8.8%) than did whites (6.8%) and others (5.6%) in the first three months of service. Blacks had lower attrition rates than caucasians in both ship and non-ship duty cohorts from the fourth month until 1 July 1980, when tracking for this thesis was terminated. The breakdown of the racial group "Other" for Hispanic and Filipiho categories yielded several noteworthy facts. Hispanics did better than average in surviving their first three months of service. However, Hispanics had the highest (31%) attrition rate for the non-ship duty cohort while the attrition rate for Hispanics assigned to the ship duty cohort was equal to the average of the entire ship duty cohort.

The Filipino members (N = 274, or 2% of the total cohort) had the lowest attrition rate for any group of individuals throughout the study. Their initial three month loss rate was one third of the total cohort average, and their ship and

non-ship duty losses were one fourth and one sixth, respectively, of those cohorts/ average losses. The combining of the "Black" and "Other" racial groups into a "minority" category is therefore likely to misrepresent the attrition rates for the separate minority groups.

Attrition rate had an inverse relationship with mental groupings, with the exception of the ship duty cohort. Mental group I had the highest attrition rate (24%) and mental group IV had the lowest (14.6%) for personnel assigned to ships.

Non-high school graduates had attrition rates twice as great as high school graduates, repeating the results of previous researchers (Lockman, Smith and Kendall, Butcher).

The positive effect of A-School training was clearly evident for both ship and non-ship duty personnel. A-School training increased the expected survival chances nearly 50% for each group. GENDET attrition was nearly twice as high for non-ship duty personnel than for their ship duty counterparts. This reinforces similar findings by Smith & Kendall (1980), and Butcher (1980).

Attrition broken down by ship unique variables (Table 13) indicated no differentiation in results for ship commissioning age and nuclear capability. Submarines experienced an attrition rate approximately one half that of other ship types. This may be due to higher screening criteria for submarine duty and the fact that sailors not making the grade aboard submarines are often transferred to the surface fleet (Potter, 1980). Smaller ships had a lower attrition rate than did

other ship sizes (Table 13). Ships with diesel or nuclear engineering plants had lower attrition rates than did steam powered ships (Table 13). An overseas or Hawaiian homeport location was also conducive to survival in the Navy. Additional screening for overseas assignment is the likely cause of the former, while sunny skies and sandy beaches, or the difficulty in getting away, are the likely causes of the latter. Individuals assigned to reserve ships had a slightly higher propensity to attrite. As reserve ships do not make the far ranging deployments the active forces ships do, first termers expecting to see the world and experience the "Adventure of the Navy" might be more inclined to terminate their service. Overall, personnel assigned to ship duty had an attrition rate (19.9%) which was approximately 20% less than individuals assigned non-ship ship duty (25.6%). This finding validates results reported by Smith and Kendall (1980).

Regression analyses results verified many of the intuitive conclusions drawn from the attrition tables. The traditional variable of years of education consistently had a positive impact on lowering attrition and increasing total active service. AFQT and age at entry had relatively small effects in the attrition equations. Minority status made a positive contribution toward survival in the equations where "minority" was included as a variable. That finding should be treated carefully due to the divergent attrition rates (see Tables 11 and 12) experienced by various ethnic groups included within "minority". Research keying on specific ethnic groups needs

to be performed to understand more fully the appropriateness of the Navy's minority recruiting policies. The non-traditional variables of A-School attendance (or not) and initial assignment to ship or non-ship duty clearly had a significant impact in the regression equations presented. Every effort should be made to send individuals to A-School training, and assignment to ships should be emphasized for first term personnel.

The impact of ship unique variables was given little support by the regression analyses performed. Only five variables (overseas and Hawaii homeport locations, submarines, and nuclear and diesel engineering plants) out of twenty four of the variables were significant enough to enter the regression equations, and those variables explained very little of the variance in the attrition rates. Logically, there must be other variables which explain the positive effect of ship duty on first term survival. Research to identify those other variables seems highly warranted.

The Survival Tracking File (STF) data base has great potential for further cohort analyses. In October of 1981, the first quarterly group of recruits with a complete data history will be eligible for reenlistment. It is recommended that the cohort be analyzed over the complete enlistment time frame with emphasis placed on those personnel re-enlisting and identification of variables which predict that action.

APPENDIX A

SURVIVOR TRACKING FILE (LONGITUDINAL) VARIABLES

Social Security Number
As-Of Date Fiscal Year
Quarter
Count
Strength Indicator
Sex
Race
Ethnic Group
Date of Birth
AFQT--(Armed Forces Qualification Test)
Education Years
Education Certification
A-School Indicator
Dependency Primary
Term Enlistment
Type Enlistment
Term Status
Number of Enlistments
Type of Acquisition
Type of Program
Rate/Special Prog Code
Branch/Class
RADO Mos--(Reserve Active Duty Obligation)
Enlisted Designator
Present Rate Code
Present Pay Grade
PNEC--(Primary Navy Enlisted Classification)
SNEC--(Secondary Navy Enlisted Classification)
ADSD--(Active Duty Start Date)
PEBD--(Pay Entry Base Date)
CED--(Current Enlistment Date)
CADD--(Current Active Duty Date)
EAOS--(Expiration of Active Obligated Service)
Soft EAOS
EAOS Change Indicator
Onboard Actual UIC--(Unit Identification Code)
Onboard ACC--(Accounting Category Code)
Onboard Sea/Shore Code
Onboard Transfer Date
Past Actual UIC
SRB Received Indicator--(Selective Reenlistment Bonus)
Zone
Skill Indicator
Award Level

RQC--(Recruit Quality Control Code)
Loss Date of Occurrence
Loss Code Navy
Loss Code DOD--(Department of Defense)

APPENDIX B

MERGED DATA FILE DESCRIPTION

			Position	Field Width
*	Race	RACE	1	1
*	Ethnic Group	ETHNIC	2	1
	Date of Birth			
	Year	DOBYR	3	2
	Month	DOBMTH	5	2
	AFQT	AFQT	7	2
	Education Years	EDUCYRS	9	2
	A-School Indicator	ASCHIND	11	1
*	Primary Dependents	DEPENDS	12	1
	Term Enlistment	TOENL	13	1
	Branch/Class	BRANCH	14	2
	Active Duty Start Date			
	Year	ADSDYR	16	2
	Month	ADSDMTH	18	2
*	Onboard Unit Identification Code	UIC	20	5
	Sea/Shore Code	TACODE	25	1
	Loss Date of Occurrence			
	Year	LOSSYR	26	2
	Month	LOSSMTH	28	2
	Loss Code Navy	LOSSCODE	30	3
	Ship/Non-Ship	SHIP	33	1
	Loss Group	LOSGROUP	34	1
	Success/Failure	SUCCESS	35	1
	Type Ship	TYPESHIP	36	1
	Class	CLASS	37	2
	Subclass	SUBCLASS	39	2
	Size	SIZE	41	1
	Age	AGE	42	1
	Engineering Plant	ENGPLANT	43	1
	Nuclear Capable/ Non-Capable	NUCCAP	44	1
	Location	LOCATION	45	1
	Active/NRF	ACTNRF	46	1
	Age at Entry	AGEYRS	N/A	N/A
	TAS--Total Active Service	TAS	N/A	N/A

*Alphanumeric Variables

A-School Indicator Codes (ASCHIND)

1. A-School graduates
2. A-School dropout
3. Currently in A-School
4. Slated to attend A-School
5. Striker
6. General Detail

Sea/Shore Code or Type Activity Code (TACODE)

1. Shore duty--Conus
2. Sea duty--Conus
3. Arduous Shore duty = Sea Duty
4. Sea duty--Overseas
5. Neutral duty
6. Shore duty overseas

APPENDIX C

UNIT IDENTIFICATION CODE TAPE DESCRIPTION

UIC--(Unit Identification Code)
Hull Number
Ship Name
Homeport
TAC--(Type Activity Code)

SHIP VARIABLE FILE DESCRIPTION (CARDS)

Ship Type
    Class
    Sub Class
Size (Personnel)
Age (Commissioning)
Engineering Plant
Nuclear Capable
Location
Active/NRF

APPENDIX D

AGE YRS and TAS VARIABLE COMPUTATION

Age at Entry (AGEYRS) Computation

Months = (ADSDYR - DOBYR) x 12

ExMths = ADSDMTH - DOBMTH

AGEYRS = Months + ExMths

Example

Start 7707 (77 - 59) x 12 = 216

Born 5903 07 - 03 = 4
216 + 4 = 220
220 ÷ 12 = 17 yrs 4 mths

Total Active Service (TAS) Computation

MTHS = (LOSSYR - ADSDYR) * 12

EXMOS = LOSSMTH - ADSDMTH

TAS = MTHS + EXMOS

TASYRS = (MTHS + _XMOS) ÷ 12

Examples

Start 7709 MTHS = (78 - 77) x 12 = 12
Loss 7802 EXMOS = 02 - 09 = -7
TAS = 12 - 7 = 5

Start 7708 (79 - 77) x 12 = 24
Loss 7909 09 - 08 = 1
24 + 1 = 25

APPENDIX E

DEFINITION OF SHIP VARIABLES

Type Ship

1. Combatants
2. Auxiliary
3. Submarine
4. Carrier
5. Amphibious *
6. Minesweeper

*Due to the small number of recruits assigned to minesweeps that category was combined with auxiliaries.

Classes

1.	SSBN	21.	LKA
2.	AGSS (Diesel)	22.	LPA
3.	SSN	23.	MSO
4.	SS	24.	AD
5.	CVN	25.	AE
6.	CV	26.	AFS
7.	CGN	27.	AG
8.	CG	28.	AGDS
9.	DDG	29.	AGF
10.	DD	30.	ADE
11.	FFG	31.	ADR
12.	FF	32.	AO
13.	PHM	33.	AR
14.	PG	34.	ARS
15.	LCC	35.	AS
16.	LHA	36.	ASR
17.	LPH	37.	ATF
18.	LPD	38.	ATS
19.	LSD	39.	AVM
20.	LST		

Sub Class

Submarines

1. Benjamin Franklin/Lafayette (31)* "Recorded-87"
2. Ethan Allen (5)
3. George Washington (5)
4. Los Angeles (10)
5. Glennard P. Lipscomb (1)
6. Narwhal (1)
7. Sturgeon (37)
8. Permit (3)

9. Tullibee (1)
10. Skipjack (5)
11. Halibut (1)
12. Triton (1)
13. Skate (4)
14. Seawolf (1)
15. Nautilus (1)
16. Barbel (3)
17. Grayback (1)
18. Darter (1)
19. Tang (3)
20. Albacore (1)
21. Dolphin (1)

Carriers

22. Nimitz (2)
23. Enterprise (1)
24. Kitty Hawk/Kennedy (4)
25. Forrestal (4)
26. Hancock (1)
27. Midway (2)
28. Virginia (3)
29. California (2)
30. Truxton (1)
31. Belknap (9)
32. Lechy (9)
33. Bainbridge (1)
34. Long Beach (1)
35. Albany (2)
36. Cleveland (1)

Guided Missile Destroyers

37. Charles F. Adams (23)
38. Coontz (10)
39. Forest Sherman/Hull (4)

Destroyers

40. Spruance (14)
41. Forest Sherman/Hull (14)
42. Fram I-Gearing (26)
43. Fram II-Carpenter(2)

Frigates/Guided Missile Frigates

44. Brooke (6)
45. Knox (46)
46. Garcia (10)
47. Glover (1)
48. Bronstein (2)

Hydrofoil

49. Pegasus (1)

Patrol Gunboat

50. Ashville (2)

Amphibious Command Ship

51. Blue Ridge (2)

Amphibious Assault Ship

52. Tarawa (3)
53. Iwo Jima (7)

Amphibious Transport Dock Ship

54. Austin (12)
55. Raleigh (2)

Dock Landing Ship

56. Anchorage (5)
57. Thomaston (8)

Tank Landing Ship

58. Newport (20)

Amphibious Cargo Ship

59. Charleston (6)
60. Tulare (1)

Amphibious Transfer Ship

61. Paul Revere (2)

Ocean Minesweeper

62. Acme (2)
63. Aggressive/Dash (23)

Destroyer Tender

64. Samuel Gompers (2)
65. Klondike/Shenandoah (3)
66. Dixie (5)

Ammunition Ship

67. Kileaua (8)
68. Suribachi/Nitro (5)

Combat Stores Ship

69. Mars (7)

Missile Test Ship

70. Compass Island (1)

Auxiliary Deep Submergence Support Ship

71. Point Barrow (1)

Command Ship

72. Lasalle (1)

Fast Combat Support Ship

73. Sacremento (4)

Oiler

74. Neosho (3)
75. Cimmaron (3)

Repair Ship

76. Ajax (4)

Salvage Ship

77. Bolster/Diver (9)

Submarine Tender

78. L.T. Spear (2)
79. Simon Lake (2)
80. Hunley (2)
81 Fulton/Proteus (7)

Submarine Rescue Ship

82. Pigeon (2)
83. Chanticleer (4)

Fleet Ocean Tug

84. Cherokee/Abnaki (6)

Salvage and Rescue Ship

85. Edenton (3)

Guided Missile Test Ship

86. Norton Sound

Submarine

87. Benjamin Franklin/Lafayette (31)

Guided Missile Frigate

88. Oliver Hazard Perry (1)

*Numbers in parentheses are number of ships in the sample group

Size

1. Less than 100 personnel
2. 100-199 personnel
3. 200-299 personnel
4. 300-399 personnel
5. 400-499 personnel
6. 500-599 personnel
7. 600-1499 personnel
8. 1500-2499 personnel
9. Greater than 2500 personnel

Groups were recorded for analysis as follows:

1 and 2 = Small
3 and 4 = Medium
5, 6, and 7 = Large
8 and 9 = Extra Large

Age

1. Ships commissioned in the 1940's
2. Ships commissioned in the 1950's
3. Ships commissioned in the 1960's
4. Ships commissioned in the 1970's

Engineering Plant (ENGPLANT)

1. Nuclear
2. 1200 PSI Steam
3. 600 PSI Steam
4. Diesel*

5. Diesel Electric*
6. Gas Turbine

*Due to the small number of recruits who were assigned in the diesel electric category they were combined with the diesel group for analysis.

Nuclear Capable (NUCCAP)

1. Nuclear Capable
2. Non-nuclear Capable

Location

1. East Coast
2. West Coast
3. Overseas (not including Hawaii)
4. Hawaii

Active or Reserve Status (ACTNRF)

1. Reserve
2. Active

APPENDIX F

SHIP TYPE--CLASS NAMES

AD	Destroyer Tender
AE	Ammunition Ship
AFS	Combat Stores Ship
AG	Missile Test Ship
AGDS	Auxiliary Deep Submergence Support Ship
AGF	Command Ship
AGSS	Research Submarine Diesel
AO	Oiler
AOE	Fast Combat Support Ship
AOR	Replenishment Oiler
AR	Repair Ship
ARS	Salvage Ship
AS	Submarine Tender
ASR	Submarine Rescue Ship
ATF	Fleet Ocean Tug
ATS	Salvage and Rescue Ship
AVM	Guided Missile Ship
AVT	Aviation Training Carrier
CG	Guided Missile Cruiser
CGN	Guided Missile Cruiser (Nuclear)
CV	Aircraft Carrier
CVN	Aircraft Carrier (Nuclear)
DD	Destroyer
DDG	Guided Missile Destroyer
FF	Frigate
FFG	Guided Missile Frigate
LCC	Amphibious Command Ship
LHA	Amphibious Assault Ship
LKA	Amphibious Cargo Ship
LPA	Amphibious Transport Ship
LPD	Amphibious Transport Docks
LPH	Amphibious Assault Ship
LSD	Dock Landing Ship
LST	Tank Landing Ship
MSO	Ocean Minesweeper
PG	Patrol Combatants
PHM	Patrol Combatant Missile (Hydrofoil)
SS	Submarine (Diesel)
SSBN	Ballistic Missile Submarine (Nuclear)
SSN	Submarine (Nuclear0

APPENDIX G

SHIP[a] DISTRIBUTION BY VARIABLES

1. Type of ship, ship classes, and personnel included in each type

Combatants

	Ship Sample N	Represented	Personnel Represented
CG	20	20	277
CGN	8	8	80
DD	58	55	524
DDG	37	37	382
FF	59	59	395
FFG	7	7	35
PG	2	0	0
PHM	2	0	0
Total	192	186	1693

Auxiliaries

AD	9	9	277
AE	13	13	204
AFS	7	7	120
AG	1	1	8
AGDS	1	1	12
AGF	1	1	23
AO	7	7	126
AOE	4	4	69
AOR	7	7	155
AR	4	4	86
ARS	9	8	38
AS	11	11	308
ASR	6	4	14
ATF	6	4	8
ATS	1	3	9
AVM	1	1	12
MSO	25	12	16
Total	115	97	1485

[a]Ships were included in the study if they were still in commission on 30 Sep 1977 or if they were commissioned prior to 1 Jul 1980.

	Actual	Represented	Personnel
Submarines			
AGSS	1	0	0
SS	8	6	9
SSAG	1	1	1
SSBN	41	34	132
SSN	73	54	97
Total	124	95	239
Carriers			
CV (Plus 1-AVT)	11	11	1066
CVN	3	3	257
Total	14	14	1323
Amphibs			
LCC	2	2	40
LHA	3	2	29
LKA	6	6	61
LPA	2	2	13
LPD	14	14	215
LPH	7	7	133
LSD	13	13	150
LST	20	20	163
Total	67	66	804

2. Ship classes and personnel by size

Small (0-200 Personnel)

	Ships
Ship Classes--AGDS	1
ARS	8
ASR	4
ATF	4
ATS	3
FF (Bronstein Class)	2
FFG (Perry Class)	1
MSO	12
SS	6
SSAG	1
SSBN	34
SSN	54
Total Ships	130
Total Personnel	351

Medium (201-400 Personnel)

		Ships
Ship Classes--	AE	13
	AG	1
	AGF	1
	AO	7
	AOR	7
	DD	55
	DDG	37
	FF (Knox Class)	57
	FFG	6
	LKA	6
	LPA	2
	LSD	13
	LST	20
Total Ships		225
Total Personnel		2198

Large (401-1500 Personnel)

		Ships
Ship Classes--	AD	7
	AFS	7
	AOE	4
	AR	4
	AS	3
	AVM	1
	CG	20
	CGN	8
	LCC	2
	LHA	2
	LPD	14
	LPH	7
Total Ships		79
Total Personnel		1359

Extra Large (1501-3300 Personnel)

		Ships
Ship Classes--	AD (Gompers Class)	2
	AS	8
	AVT	1
	CV	10
	CVN	3
Total Ships		24
Total Personnel		

3. Ship Classes and personnel by commission age

Commissioned--1940's

		Ships
Ship Classes--	AD	6
	AO	3
	AR	4
	ARS	8
	AS	5
	ASR	3
	ATF	4
	AVM	1
	AVT	1
	CG	3
	CV	2
	DD	27
	MSO	12
Total Ships		79
Total Personnel		1087

Commissioned--1950's

		Ships
Ship Classes--	AD	1
	AE	5
	AG	1
	AGDS	1
	AO	4
	CV	4
	DD	14
	DDG	11
	LPA	1
	LSD	8
	LKA	1
	SS	6
	SSAG	1
	SSN	5
Total Ships		63
Total Personnel		1004

Commissioned 1960's

		Ships
Ship Classes--	AD	2
	AE	2
	AFS	6
	AGF	1
	AGSS	1
	AOE	2
	AOR	2
	AS	4

Commissioned 1960's (Cont.)

	Ships
Ship Classes--CG	17
CGN	3
CV	4
CVN	1
DDG	26
FF	18
FFG	6
LKA	4
LPA	1
LPD	9
LPH	6
LSD	1
LST	2
SSN	26
SSBN	34
Total Ships	178
Total Personnel	2112

Commissioned 1970's

	Ships
Ship Classes--AE	6
AFS	1
AOE	1
AOR	5
AS	2
ASR	1
ATS	3
CGN	5
CVN	2
DD	14
FF	41
FFG	1
LCC	2
LHA	2
LPD	5
LPH	1
LKA	1
LSD	4
LST	18
SSN	23
Total Ships	138
Total Personnel	1341

4. Ship classes and personnel by engineering plant status

Nuclear

		Ships
Ship Classes--	CGN	8
	CVN	3
	SSBN	34
	SSN	54
Total Ships		99
Total Personnel		566

1200 PSI Steam

		Ships
Ship Classes--	CG	17
	CV	7
	DD	14
	DDG	37
	FF	47
	LHA	2
Total		124
Total Personnel		1769

600 PSI Steam

		Ships
Ship Classes--	AD	9
	AE	13
	AFS	7
	AG	1
	AGDS	1
	AGF	1
	AO	7
	AOE	4
	AOR	7
	AR	4
	AS	11
	AVM	1
	AVT	1
	CG	3
	CV	3
	DD	27
	FF	12
	FFG	6
	LCC	2
	LKA	6
	LPA	2
	LPB	14
	LPH	7
	LSD	13
Total Ships		162
Total Personnel		2836

Diesel

		Ships
Ship Classes--ARS		8
	ASR	4
	ATF	4
	ATS	3
	LST	20
	MSO	12
	SS	6
	SSAG	1
Total Ships		58
Total Personnel		258

Gas Turbine

		Ships
Ship Classes--DD		14
	FFG (Perry Class)	1
Total Ships		15
Total Personnel		115

5. Ship classes and personnel by nuclear capable status

Nuclear Capable

		Ships
Ship Classes--AD		9
	AE	13
	AOE	4
	AOR	7
	AS	11
	CG	20
	CGN	8
	CV	10
	CVN	3
	DD	27
	DDG	37
	FF	59
	FFG	7
	LPD	14
	LPH	7
	SSBN	34
	SSN	54
Total Ships		324
Total Personnel		4217

Non-Nuclear Capable

	Ships
Ship Classes--AFS	7
AG	1
AGDS	1
AGF	1
AO	7
AR	4
ARS	8
ASR	4
ATF	4
ATS	3
AVM	1
AVT	1
DD	28
LCC	2
LHA	2
LKA	6
LPA	2
LSD	13
LST	20
MSO	12
SS	6
SSAG	1
Total Ships	134
Total Personnel	1265

6. Ship classes and personnel by location of homeport

	Ships	Personnel
East Coast		
Total	238	3042
West Coast		
Total	157	1743
Hawaii		
Total	46	347
Overseas		
Total	17	412

7. Ship classes and personnel by active or reserve status

	Ships	Personnel
Active		
Total	416	5242
NRF		
Total	42	302

Naval Reserve Fleet (NRF) Classes

ATF	--	2
DD	--	27
LPA	--	2
LST	--	2
MSO	--	9

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